1. **Proposed by Professor G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.**

Three persons A, B, C, throw with three dice. They each stake \$10.00 and the one who first throws at least ten with the three dice takes the whole stake. Find the expectation of each.

Solution by the Proposer.

The chance of throwing respectively 10, 11, 12, ..., 18, with three dice is $\frac{27}{216}$, $\frac{27}{216}$, $\frac{25}{216}$, $\frac{21}{216}$, $\frac{15}{216}$, $\frac{10}{216}$, $\frac{6}{216}$, $\frac{3}{216}$, $\frac{1}{216}$.

The chance of throwing at least ten is equal to the sum of all these chances$=\frac{135}{216}=\frac{5}{8}$.

The chance that A will win $=\frac{5}{8}$, that he will not win $=\frac{3}{8}$. The chance that B will win $=\frac{5}{8}.\frac{3}{8}$, that he will not win $=(\frac{3}{8})^2$. The chance that C will win $=\frac{5}{8}.(\frac{3}{8})^2$. The chance that A will win the second throw $=\frac{5}{8}.(\frac{3}{8})^3$, that B will win$=\frac{5}{8}.(\frac{3}{8})^4$, that C will win $=\frac{5}{8}.(\frac{3}{8})^5$.

$$\therefore\ A\text{'s chance} =\tfrac{5}{8}+\tfrac{5}{8}(\tfrac{3}{8})^3+\tfrac{5}{8}(\tfrac{3}{8})^6+\ldots.=\tfrac{64}{97},$$
$$B\text{'s chance} =\tfrac{5}{8}(\tfrac{3}{8})+\tfrac{5}{8}(\tfrac{3}{8})^4+\tfrac{5}{8}(\tfrac{3}{8})^7+\ldots.=\tfrac{24}{97},$$
$$C\text{'s chance} =\tfrac{5}{8}(\tfrac{3}{8})^2=\tfrac{5}{8}(\tfrac{3}{8})^5+\tfrac{5}{8}(\tfrac{3}{8})^8+\ldots.=\tfrac{9}{97},$$
$$A\text{'s expectation} =(\tfrac{64}{97}\times 30)-10=\$9\tfrac{77}{97},$$
$$B\text{'s expectation} =(\tfrac{24}{97}\times 30)-10=-\$2\tfrac{56}{97},$$
$$C\text{'s expectation} =(\tfrac{9}{97}\times 30)-10=-\$7\tfrac{21}{97}.$$

Also solved by *L. V. Roy*, *P. H. Philbrick*, *J. F. W. Scheffer*, *H. C. Whitaker*, and *W. H. Draughon*

PROBLEMS.

4. **Proposed by G. B. M. ZERR, Principal of High School, Staunton, Virginia.**

Four points taken at random in each half, made by the transverse axis, of an ellipse, are joined in such a way by straight lines as to enclose an octagonal surface; find the mean area of this surface.

5. **Proposed by DE VOLSON WOOD, M. A., C. E., Professor of Mechanical Engineering, Stevens Institute of Technology, Hoboken, New Jersey.**

An actual case suggested the following:

An equal number of white and black balls of equal size are thrown into a rectangular box, what is the probability that there will be contiguous contact of white balls from one end of the box to the opposite end? As a special example, suppose there are 30 ball in the length of the box, 10 in the width, and 5 (or 10) layers deep.

Solutions to these problems should be received on or before May 1st.

MISCELLANEOUS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

1. **Proposed by G. B. M. ZERR, A. M., Principal of High School, Staunton, Virginia.**

To divide the arc of a cycloid into eight equal parts.